

Criticality Analysis Checklist

New Fuel Storage Rack and Spent Fuel Pool

Subject	Included	Justification / Explanation
1.0 Introduction		
Purpose of submittal	YES/NO	
License changes requested	YES/NO	
Summary of physical changes	YES/NO	
Summary of analytical scope	YES/NO	
2.0 Acceptance Criteria and Regulatory Guidance		
Summary of requirements and guidance	YES/NO	
Requirements documents referenced	YES/NO	
Guidance documents referenced	YES/NO	
Acceptance criteria described	YES/NO	
3.0 Storage Rack Description		
New fuel storage rack description	YES/NO	
Nominal and tolerance dimensions	YES/NO	
Cross-section schematic	YES/NO	
Spent fuel storage rack description	YES/NO	
Nominal and tolerance dimensions	YES/NO	
Cross-section schematic	YES/NO	
4.0 Fuel Design Description		
Describe all fuel in pool	YES/NO	
Nominal and tolerance dimensions	YES/NO	
Describe future fuel to be covered	YES/NO	
Describe all fuel inserts	YES/NO	
Nominal and tolerance dimensions	YES/NO	
Describe non-standard fuel	YES/NO	
Describe non-fuel items in fuel cells	YES/NO	
Nominal and tolerance dimensions	YES/NO	
5.0 Overview of the Method of Analysis		
New fuel rack analysis description	YES/NO	
Storage geometries	YES/NO	
Bounding assembly design(s)	YES/NO	
Integral absorber credit	YES/NO	
Accident analysis	YES/NO	
Spent fuel storage rack analysis description	YES/NO	
Storage geometries	YES/NO	
Bounding assembly design(s)	YES/NO	
Soluble boron credit	YES/NO	
Boron dilution analysis	YES/NO	
Burnup credit	YES/NO	
Decay time credit	YES/NO	
Integral absorber credit	YES/NO	

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Other credit	YES/NO	
Fixed neutron absorbers	YES/NO	
Aging management program	YES/NO	
Accident analysis	YES/NO	
Temperature increase	YES/NO	
Assembly drop	YES/NO	
Multiple misload	YES/NO	
Boron dilution	YES/NO	
Other	YES/NO	
Fuel out of rack analysis	YES/NO	
Handling	YES/NO	
Movement	YES/NO	
Inspection	YES/NO	
6.0 Cross Sections, Computer Codes, and Validation		
Code/Modules Used for Calculation of k_{eff}	YES/NO	
Cross section library	YES/NO	
List all the isotopes used	YES/NO	
Convergence checks	YES/NO	
Code/Module Used for Depletion Calculation	YES/NO	
Cross section library	YES/NO	
List all the isotopes used	YES/NO	
Convergence checks	YES/NO	
Validation of Depleted Fuel Isotopic Content	YES/NO	
Validation of Code and Library	YES/NO	
Major Actinides and Structural Materials	YES/NO	
Minor Actinides and Fission Products	YES/NO	
7.0 Criticality Safety Analysis of the New Fuel Rack		
Rack model	YES/NO	
Boundary conditions	YES/NO	
Source distribution	YES/NO	
Geometry restrictions	YES/NO	
Limiting fuel design	YES/NO	
Fuel density	YES/NO	
Grids	YES/NO	
Burnable Poisons	YES/NO	
Fuel dimensions	YES/NO	
Axial blankets	YES/NO	
Fuel plenum and end plug region	YES/NO	
Limiting rack model	YES/NO	
Storage area walls	YES/NO	
Temperature	YES/NO	
Multiple regions	YES/NO	
Flooded	YES/NO	

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Low density moderator	YES/NO	
Asymmetric fuel placement	YES/NO	
Tolerances	YES/NO	
Fuel geometry	YES/NO	
Fuel pin pitch	YES/NO	
Fuel pellet OD	YES/NO	
Fuel clad ID	YES/NO	
Fuel clad OD	YES/NO	
Guide tube ID	YES/NO	
Guide tube OD	YES/NO	
Axial fuel position	YES/NO	
Axial Fuel Length	YES/NO	
Fuel content		
Enrichment	YES/NO	
Dish and Chamfer	YES/NO	
Density	YES/NO	
Rack geometry		
Rack pitch	YES/NO	
Cell wall thickness	YES/NO	
Concrete Composition	YES/NO	
Code uncertainty	YES/NO	
Absorber geometry and content	YES/NO	
Biases		
Temperature	YES/NO	
Code bias	YES/NO	
Absorber geometry and content	YES/NO	
Accident analysis		
Flooding (water and low density moderator)	YES/NO	
8.0 Depletion Modeling and Burnup Effects		
Depletion Model Considerations		
Time step verification	YES/NO	
Convergence verification	YES/NO	
Simplifications	YES/NO	
Non-uniform enrichments	YES/NO	
Nodalization	YES/NO	
Fuel clad creep and grid growth	YES/NO	
Limiting depletion parameters		
Burnable Absorbers	YES/NO	
Integral absorbers	YES/NO	
Soluble Boron	YES/NO	
Fuel and Water Temperature	YES/NO	
Specific power	YES/NO	
Control rod insertion	YES/NO	
Axial burnup shapes	YES/NO	
Grids	YES/NO	

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Depleted fuel content nuclide selection		
Number of nuclides	YES/NO	
Decay time	YES/NO	
	YES/NO	
9.0 Spent Fuel Rack Analysis		
Rack model	YES/NO	
Boundary conditions	YES/NO	
Source distribution	YES/NO	
Geometry restrictions	YES/NO	
Limiting fuel design	YES/NO	
Fuel density	YES/NO	
Grids	YES/NO	
Burnable Poisons	YES/NO	
Fuel assembly inserts	YES/NO	
Fuel dimensions	YES/NO	
Axial blankets	YES/NO	
Configurations considered	YES/NO	
Borated	YES/NO	
Unborated	YES/NO	
Multiple rack designs	YES/NO	
Alternate storage geometry	YES/NO	
Axial burnup shapes		
Uniform/Distributed	YES/NO	
Tolerances		
Fuel geometry		
Fuel rod pin pitch	YES/NO	
Fuel pellet OD	YES/NO	
Cladding OD	YES/NO	
Axial fuel position	YES/NO	
Fuel stack height	YES/NO	
Measured burnup	YES/NO	
Fuel content		
Enrichment	YES/NO	
Rack geometry		
Cell wall thickness	YES/NO	
Rack cell pitch	YES/NO	
Boraflex wrapper thickness	YES/NO	
Boraflex wrapper height	YES/NO	
Rack tie plate thickness and width	YES/NO	
Rack cell pitch	YES/NO	
Code uncertainty	YES/NO	
KENO case uncertainty	YES/NO	
Biases		
Fuel design	YES/NO	
Minor actinides and fission product worth	YES/NO	

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Subject	Included	Justification / Explanation
Code bias	YES/NO	
Temperature	YES/NO	
Incore thimble depletion effect	YES/NO	
NRC administrative margin	YES/NO	
Modeling simplifications		
Axial reflectors	YES/NO	
10.0 Interface Analysis		
Region interface effects	YES/NO	
	YES/NO	
11.0 Normal Conditions		
Fuel handling equipment	YES/NO	
Administrative controls	YES/NO	
Fuel inspection equipment or processes	YES/NO	
12.0 Accident Analysis		
Boron dilution	YES/NO	
Normal conditions	YES/NO	
Accident conditions	YES/NO	
Multiple fuel misload	YES/NO	
Dropped assembly	YES/NO	
Temperature	YES/NO	
Seismic event	YES/NO	
13.0 Summary and Conclusions		
Summary of results	YES/NO	
Burnup curve interpolation	YES/NO	
New administrative controls	YES/NO	
Technical Specification markups	YES/NO	
Appendix A Computer Code Validation:		
Code validation methodology and bases	YES/NO	
New Fuel	YES/NO	
Depleted Fuel	YES/NO	
MOX	YES/NO	
HTC	YES/NO	
High temperature	YES/NO	
Convergence	YES/NO	
Trends	YES/NO	
Bias and uncertainty	YES/NO	
Range of applicability	YES/NO	